

An Illustration of the Tragedy of the Commons: A Fishing Game

Imagine that you own a fleet of boats that are used to catch fish in a particular lake. There is one other fleet of fishing boats that also operates on this lake. On any given single day, the amount of fish caught by your fleet depends both on the number of boats you sent out and on the number the other fleet sent out. Table 1 lists the amount of fish (in pounds) caught for a given total number of boats on the lake. Figure 1 shows the amount of fish caught by each fleet in a day, depending on how many ships each fleet sent out. (Your catch is shown first.)

Total number of boats	Fish caught
1	38
2	72
3	102
4	104
5	120
6	132
7	140
8	144
9	144
10	144

Table 1: Amount of fish caught given a number of boats

Suppose that a pound of fish can be sold for \$1 and that it costs \$10 to send out a fishing boat for a day.

1. Suppose you want to send out the number of boats that will maximize your own profit. How many of your boats should you send out, given a hypothetical number of boats sent out by the other fleet? Compute and write the corresponding profit into each cell in Figure 2 and then your optimal number of boats into Figure 3.

		Other Fleet					
		<i>0 boats</i>	<i>1 boat</i>	<i>2 boats</i>	<i>3 boats</i>	<i>4 boats</i>	<i>5 boats</i>
Your Fleet	<i>0 boats</i>	0, 0	0, 32	0, 60	0, 84	0, 104	0, 120
	<i>1 boat</i>	32, 0	30, 30	28, 56	26, 78	24, 96	22, 110
	<i>2 boats</i>	60, 0	56, 28	52, 52	48, 72	44, 88	40, 100
	<i>3 boats</i>	84, 0	78, 26	72, 48	66, 66	60, 80	54, 90
	<i>4 boats</i>	104, 0	96, 24	88, 44	80, 60	72, 72	64, 80
	<i>5 boats</i>	120, 0	110, 22	100, 40	90, 54	80, 64	72, 72

Figure 1: Amount of fish caught by each fleet

		Other Fleet					
		<i>0 boats</i>	<i>1 boat</i>	<i>2 boats</i>	<i>3 boats</i>	<i>4 boats</i>	<i>5 boats</i>
Your Fleet	<i>0 boats</i>	,	,	,	,	,	,
	<i>1 boat</i>	,	,	,	,	,	,
	<i>2 boats</i>	,	,	,	,	,	,
	<i>3 boats</i>	,	,	,	,	,	,
	<i>4 boats</i>	,	,	,	,	,	,
	<i>5 boats</i>	,	,	,	,	,	,

Figure 2: Profit to each fleet

- Suppose that the owner of the other fleet will also be picking a number of boats to maximize her profit, how many of your boats should you send out?
- Now, suppose that you can pick the number of boats that both your fleet and the other fleet send out (but, to be fair, you have to allow the other fleet to send out exactly the same number of boats that you send out). Assuming that you are interested in maximizing the total profit of both fleets, how many of your boats would you send out in this case?
- How does your answer to the above questions change when the cost of sending out a fishing boat cost \$20 instead of \$10?
- How would you solve this particular “tragedy of the commons”?

		Other Fleet					
		<i>0 boats</i>	<i>1 boat</i>	<i>2 boats</i>	<i>3 boats</i>	<i>4 boats</i>	<i>5 boats</i>
<i>Your Best Response</i>							

Figure 3: Your Best Response